Domain is the set of all real numbers unless we have one of the following situations:

1) Fraction with variables in the denominator
(set denominator $\neq 0$ and solve)

2) Variable under a square root.
(set under square root ≥ 0 and solve)

3) Variables under a square root in the denominator of a fraction.
(set under square root > 0)

II. Find the **domain** of each

1. $y = \frac{1}{x-3}$

$x-3 \neq 0$
$+3 \quad +3$
$x \neq 3$

2. $y = \frac{5}{x^2-4}$

$x^2-4 \neq 0$
$+4 \quad +4$
$x^2 \neq 4$
$x \neq \pm 2$

3. $y = \frac{1}{x+9}$

$x+9 \neq 0$
$-9 \quad -9$
$x \neq -9$

4. $y = \frac{x+1}{x^2-5x-24}$

$x^2-5x-24 \neq 0$
$(x-8)(x+3) \neq 0$

5. $y = \sqrt{x-5}$

$x-5 \geq 0$
$+5 \quad +5$
$x \geq 5$

6. $y = \frac{5}{\sqrt{x-3}}$

$x-8 \neq 0 \quad x+3 \neq 0$
$x \neq 8 \quad x \neq -3$

7. $y = \sqrt{x+7}$

8. $y = \frac{5}{\sqrt{x+9}}$

$x+9 > 0$
$-9 \quad -9$
$x > -9$

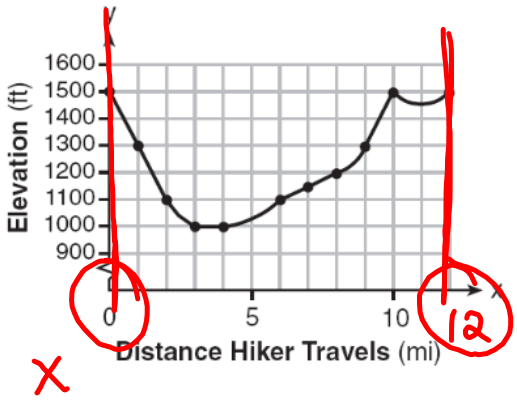
9. $y = \sqrt{x-11}$

10. $y = \frac{5}{\sqrt{2x+5}}$

$2x+5 > 0$
$-5 \quad -5$
$\frac{2x}{2} > \frac{-5}{2}$
$x > -\frac{5}{2}$

III.

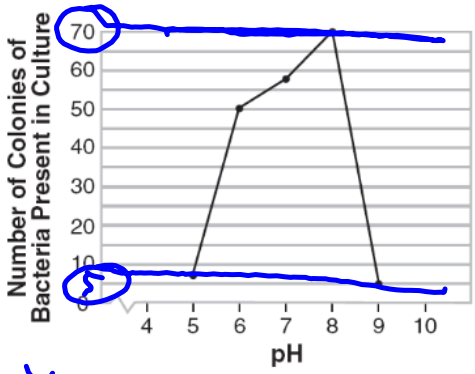
1) The accompanying graph shows the elevation of a certain region in New York State as a hiker travels along a trail.



What is the domain of this function?

(1) $1{,}000 \le x \le 1{,}500$
(2) $1{,}000 \le y \le 1{,}500$
(3) $0 \le x \le 12$
(4) $0 \le y \le 12$

2) The accompanying graph illustrates the presence of a certain strain of bacteria at various pH levels.



What is the range of this set of data?

(1) $5 \le x \le 9$
(2) $5 \le x \le 70$
(3) $0 \le y \le 70$
(4) $5 \le y \le 70$

IV. More practice

Find the domain of each

1. $y = \frac{1}{x-55}$

2. $y = \frac{5}{x^2-9}$

3. $y = \frac{134}{16-x}$

4. $y = \frac{9}{x^2-81}$

5. $y = \frac{5}{x^2+2x-24}$

6. $y = \frac{x}{x^2+10x+25}$

7. $y = \frac{56x-42}{x^2+36}$